

## CLAIMS:

1. An air conditioner access fitting comprising:
  - a valve body comprising a threaded bore and an annular valve seat extending around the bore, the valve body configured and the valve seat positioned such that all fluid that passes through the bore crosses the valve seat;
  - a twist-to-open valve disposed in the bore and threadedly engaged with the valve body, the valve comprising a valve element configured to form a polymer-to-metal seal with the valve seat, the polymer-to-metal seal stopping substantially all fluid flow through the bore and the flow path when the twist-to-open valve is closed;
  - the valve body further comprising a quick-connect shoulder disposed around the bore.
2. The air conditioner access fitting of Claim 1 wherein the twist-to-open valve comprises a second bore in fluid communication with the valve seat, and wherein the access fitting further comprises:
  - a valve core disposed in the second bore and operative selectively to open and close a flow path extending through the second bore.
3. The air conditioner access fitting of Claim 2 wherein the valve core further comprises a receptacle opposite the valve element, the receptacle for receiving a fitting to open the polymer-to-metal seal.
4. The air conditioner access fitting of Claim 1 wherein the twist-to-open valve comprises an end portion opposite the valve element, the end portion extending out of the valve body and comprising a plurality of wrench flats.
5. The air conditioner access fitting of Claim 1 further comprising:

a first locking element disposed between the valve body and the twist-to-open valve to restrain the twist-to-open valve from movement out of the bore.

5. The air conditioner access fitting of Claim 2 wherein the twist-to-open valve further comprises a second locking element disposed between the valve core and the remainder of the twist-to-open valve at an end opposite the valve element to restrain the valve core from movement out of the remainder of the twist-to-open valve.

10. The air conditioner access fitting of Claim 5 or 6 wherein the locking element comprises a split ring.

8. The air conditioner access fitting of Claim 7 wherein the valve body comprises:

an inwardly-facing chamfer adjacent an open end of the bore, the chamfer configured to compress the split ring at assembly; and

15. an annular recess positioned to receive the split ring, the recess positioned to allow the split ring to move along the bore to accommodate movement of the twist-to-open valve between closed and opened positions, the recess terminating in a shoulder positioned to prevent the split ring from moving beyond the shoulder toward the chamfer.

20. The air conditioner access fitting of Claim 1 wherein the polymer of the polymer-to-metal seal comprises a polyimide.

10. The air conditioner access fitting of Claim 1 wherein the polymer of the polymer-to-metal seal comprises polyethelether ketone.

25. The air conditioner access fitting of Claim 1 wherein the valve body comprises a body portion configured for connection to an air conditioner system, wherein the twist-to-open valve comprises a set of external threads that threadedly engage the bore, and wherein the valve seat is disposed between the body portion and the external threads.

12. An air conditioner service fitting comprising:

a valve body comprising a threaded bore and an annular valve seat extending around the bore, the valve body configured and the valve seat positioned such that all fluid that passes through the bore crosses the valve seat;

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a twist-to-open valve disposed in the bore and threadedly engaged with the valve body, the valve comprising a valve element configured to form a polymer-to-metal seal with the valve seat, the polymer-to-metal seal stopping substantially all fluid flow through the bore and the flow path when the twist-to-open valve is closed;

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the valve body further comprising an external connection feature disposed around the bore;

wherein the valve body comprises an external sealing surface.

13. The air conditioner access fitting of Claim 12 further comprising:

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a first locking element disposed within a first slot in the valve body to restrain the twist-to-open valve from movement out of the bore.

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14. The air conditioner access fitting of Claim 13, wherein the twist-to-open valve further comprises an external thread that engages the first lock element to restrain the twist-to-open valve from movement out of the bore when the polymer-to-metal seal is open.

15. The air conditioner access fitting of Claim 13 wherein the first lock element comprises a split ring.

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16. The air conditioner access fitting of Claim 12 wherein the twist-to-open valve comprises a valve housing, and wherein the access fitting further comprises:

a valve core disposed within the valve housing and operative selectively to open and close a flow path extending through the valve housing.

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17. The air conditioner access fitting of Claim 16 further comprising:  
a second locking element disposed within a second slot in the  
twist-to-open valve to restrain the valve core from movement out of the valve  
housing.

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18. The air conditioner access fitting of Claim 17 wherein the twist-  
to-open valve further comprises a shoulder that engages the second lock  
element to restrain the valve core from movement out of the valve housing  
when the twist-to-open valve is open.

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19. The air conditioner access fitting of Claim 17 wherein the  
second lock element comprises a split ring.

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20. The air conditioner access fitting of Claim 16 wherein the valve  
core further comprises a receptacle opposite the valve element, the  
receptacle for receiving a fitting to open the polymer-to-metal seal.

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21. The air conditioner access fitting of Claim 20 further comprising  
a first actuator attached to the receptacle for opening the polymer-to-metal  
seal.

22. The air conditioner access fitting of Claim 21 wherein the first  
actuator further comprises a manual handle.

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23. The air conditioner access fitting of Claim 16 further comprising  
a second actuator attached to an end of the valve core for opening the valve  
core.

24. The air conditioner access fitting of Claim 23 wherein the  
second actuator further comprises a manual handle.

25. The air conditioner access fitting of Claim 12 wherein the  
polymer of the polymer-to-metal seal comprises a polyimide.

26. The air conditioner access fitting of Claim 12 wherein the polymer of the polymer-to-metal seal comprises polyethelether ketone.

27. An air conditioner service fitting comprising:

5           a valve body comprising a threaded bore that forms a refrigerant introduction/removal flow path and an annular valve seat extending around the bore;

10           a twist-to-open valve disposed in the bore and threadedly engaged with the valve body, the valve comprising a valve element configured to form a polymer-to-metal seal with the valve seat and a valve housing;

15           the valve body further comprising a quick-connect shoulder disposed around the bore;

20           a first locking element disposed within the valve body to restrain the twist-to-open valve from movement out of the bore;

25           a valve core disposed within the valve housing and operative selectively to open and close a flow path extending through the valve housing; and

28. The air conditioner service fitting of claim 27 wherein the first and second locking elements each comprises a split ring.

29. The air conditioner service fitting of Claim 27 wherein the valve core further comprises a receptacle opposite the valve element, the receptacle for receiving a fitting to open the polymer-to-metal seal.